# UNIVERSITY OF BOLOGNA
### *Course on Harbour Engineering*

**Exercise – Application of the CERC formula to study the evolution of the coastline**

The geometry of a coastline is described by the coordinates along the X axis given in the first column of the file:

https://www.albertomontanari.it/sites/default/files/didattica/coastal/coast.txt

The second column reports the limiting geometry of the shoreline, which would be attained if a significant erosion occurred.

The coordinates along the Y axis are equally spaced with a step of 150 metres, while the time step is 3.472200E-03 days.

The beach is subjected to a wave forcing that is described in the file:

https://www.albertomontanari.it/sites/default/files/didattica/coastal/wave-forcing.txt

The first three rows of the file report the spatial step along the Y axis, the time step and the length of the simulation in terms of time steps.

The following 5 columns report:

1) The Position of wave breaker line (not required for performing the simulation) in terms of distance from the corresponding X coordinates of the shoreline;

2) The wave height at the breakerline;

3) The wave length at the breakerline;

4) The sea bottom depth at the breakerline;

5) The wave angle $\alpha$ with respect to the Y axis (the wave angle is equal to 180° when waves are directed along the Y axis and oriented towards increasing Ys – $\alpha_2$ is the angle between wave and coastline, See Figure 1).

The student is kindly requested to run a simulation of the beach evolution along 1000 time steps.